Injury Extra 41 (2010) 92–96

Contents lists available at ScienceDirect

Injury Extra

journal homepage: www.elsevier.com/locate/inext

Case report

A case of a wooden foreign body penetrating the oral cavity and reaching the posterior neck

Hiroyuki Wakisaka [a,b,*], Hirotaka Takahashi [a], Toru Ugumori [a], Kazumi Motoyoshi [a], Daiki Takagi [a]

[a] Department of Otorhinolaryngology, Head and Neck Surgery, Ehime University School of Medicine, Japan
[b] Department of Anatomy and Embryology, Ehime University School of Medicine, Japan

ARTICLE INFO

Article history:
Accepted 27 April 2010

1. Introduction

Foreign body penetration injuries of the oral cavity or pharynx are frequently encountered in daily clinical settings. Most foreign bodies are retained in superficial layers of the oral cavity or pharynx and are removable on an outpatient basis. In some cases, however, a foreign body such as a chopstick penetrates the oral cavity, causing injury to the brain, brainstem, spinal cord, or major vessels. In these serious cases, diagnostic imaging to identify the location of the foreign body is important, and maintenance of the airway before and after removal and control of bleeding and thrombi from injuries of major vessels are necessary, often requiring cooperation among various departments. We report here a patient in whom a chopstick pierced the oral cavity, passed through the parapharyngeal space, traversed the deep layer of the internal carotid artery and lodged in the posterior cervical region.

2. Case report

Patient: A 34-year-old man.
Chief complaint: Bleeding in the oral cavity and a foreign body protruding from the oral cavity.

Fig. 1. Findings on initial examination. A chopstick protrudes from the oral cavity. A protuberance was noted at the right posterior neck. Arrow and the tip of the chopstick reached the subcutaneous area just below the swollen region.

* Corresponding author at: Department of Otorhinolaryngology, Head and Neck Surgery, Ehime University School of Medicine, Shitsukawa 454, Toon City, Ehime Prefecture 791-0204, Japan. Tel.: +81 089 960 5366; fax: +81 089 960 5368.
E-mail address: wakisaka@m.ehime-u.ac.jp (H. Wakisaka).

1572-3461
doi:10.1016/j.injury.2010.04.026

Present illness: On July 8, 2007, a prison officer found the man crouching at the corner of his cell after dinner. A chopstick had pierced the oral cavity and bleeding was noted from the site of penetration. He was transferred to the emergency department of our hospital and referred to our department.

Past history: Substance dependence and epilepsy.

Findings on initial examination: A bamboo chopstick protruded from the oral cavity. Bleeding from the oral cavity had spontaneously stopped. The chopstick penetrated the right oral floor and a protuberance was noted at the right posterior neck, consistent with the end of the chopstick (Fig. 1). Slight cervical emphysema was found. The chopstick was not fixed and was unstable, moving easily horizontally upon swallowing or other relevant actions.

Findings from enhanced CT: Horizontal cross-sectional imaging confirmed that a foreign body had entered the right oral floor, passed through the parapharyngeal space, traversed the deep region of the internal carotid artery, and reached the posterior edge of the right sternocleidomastoid muscle (Fig. 2a–d). Fig. 3 compares images on standard and higher CT window settings. On the standard setting, the foreign body (CT value: −372.6 HU) appeared as a non-attenuated area which was indistinguishable from air (CT value: −1000 HU) (Fig. 3a), but increasing the setting identified it as a low-attenuation area (Fig. 3b). In enhanced CT images, standard settings (Fig. 3c) suggested that the foreign body might have contacted the lumen of internal carotid artery, whereas higher window settings set to visualise the CT values of the foreign body (Fig. 3d) demonstrated the presence of some distance between the foreign body and the arterial lumen, indicating that the blood vessel walls were preserved.

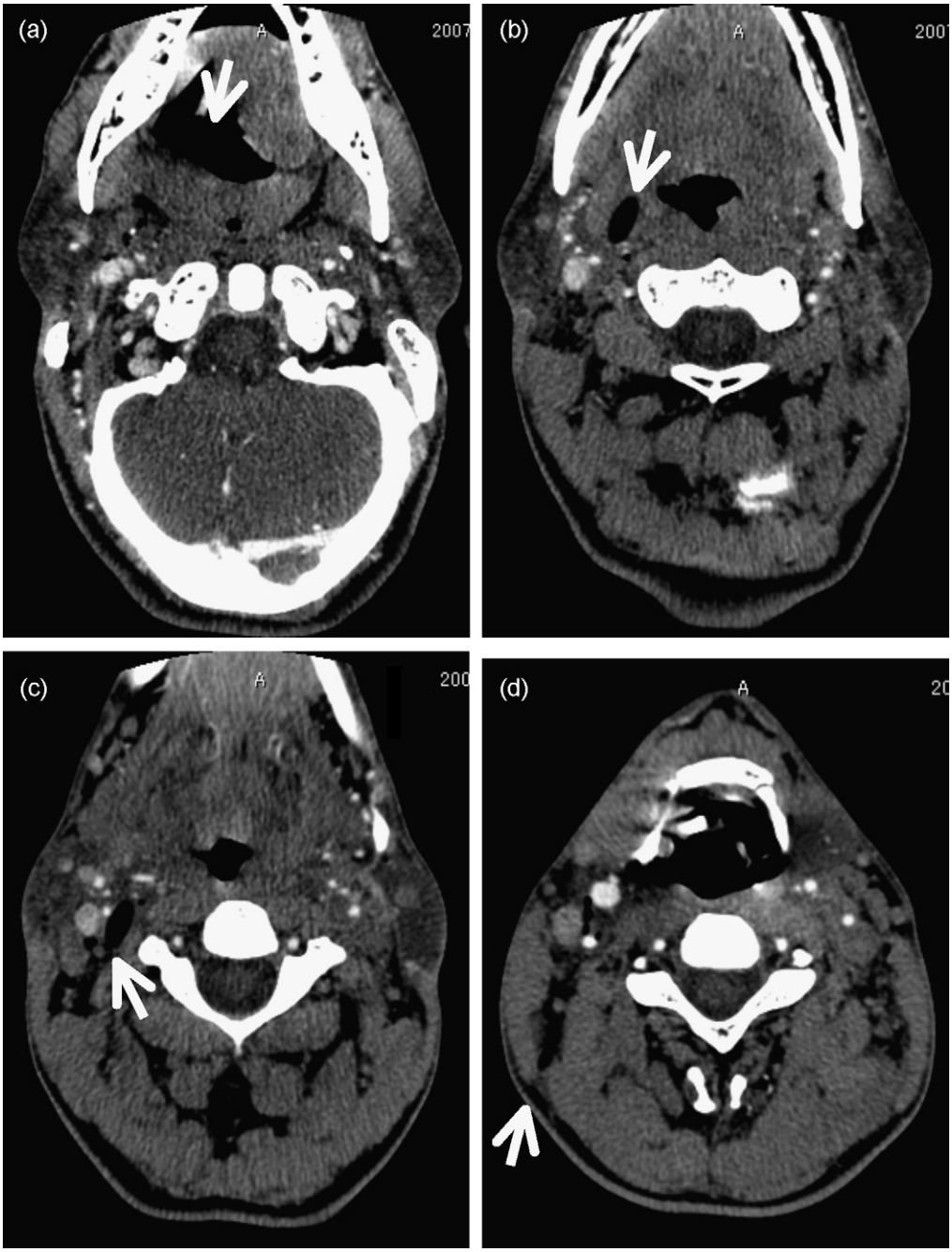

Fig. 2. Enhanced CT on standard CT window settings. The foreign body is visualised as a non-attenuated area (arrow). It passed through the parapharyngeal space (b), traversed the deep region of the internal carotid artery (c), and reached the subcutaneous area of the posterior neck (d).

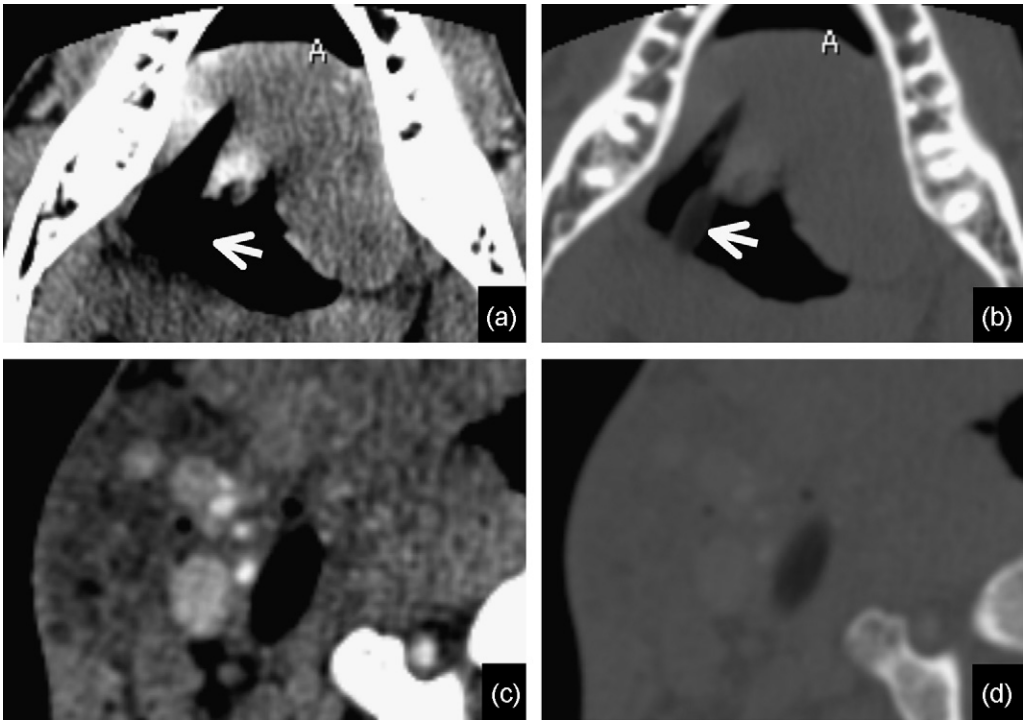

Fig. 3. Comparison between enhanced CT with standard and higher CT window settings. With the standard CT window settings, the foreign body showed no attenuation and was indistinguishable from air (a). With higher CT window settings set to visualise the CT values of the foreign body, the foreign body was detected as a low-attenuation area (b). With the standard CT window settings, the non-attenuated area indicating the foreign body appeared to have some contact with the lumen of internal carotid artery (c), but separation was seen with the higher window settings (d), suggesting that the blood vessel walls were preserved.

Surgery for removal of the foreign body: The CT findings confirmed that it was unlikely that the foreign body had injured the walls of internal carotid artery. Further, it was not fixed but somewhat unstable, moving with no resistance when gently touched and easily with swallowing and other relevant actions. Removal by extraction was considered more appropriate than via external incision of the neck. However, given the possibility that a loss of tamponade following removal might induce bleeding, in turn requiring maintenance of the airway and external incision, we decided to first maintain the airway and then extract the foreign body under general anesthesia. As oral intubation was not practical due to the presence of the foreign body, tracheotomy was performed under local anesthesia to enable the induction of general anesthesia. The relevant area of the neck was disinfected so that an external incision could immediately be performed in case of bleeding. The foreign body was then carefully extracted, which was achieved without resistance. After extraction, the neck and oral wound were observed carefully and neither swelling nor haemorrhage were noted. The wound was thoroughly washed with physiological saline and the operation was ended.

3. Postoperative course

The patient received antibiotics for 3 days after the operation. In the HCU, he was carefully examined for postoperative bleeding or occlusion of the internal carotid artery. Follow-up CT examination on the 3rd postoperative day revealed no abscess formation. The tracheotomy cannula was removed on the 4th postoperative day and the patient was discharged on the 5th postoperative day.

4. Discussion

A few reports on penetrating wooden foreign bodies in the head or neck have appeared in the international literature, most involving pieces of wood or branches. The number of cases involving chopsticks is low, at six,[2–5,7,8] all of which occurred in children in Japan and South Korea, suggesting a close relationship with the use of chopsticks in the local culture. These six cases involved lodgment in the cranial base, intracranial locations, temporal region of the head, or nose. In contrast, penetration of the oral floor reaching to the neck has not been reported. In the Japanese language literature, in contrast, 14 cases of chopstick foreign bodies have been described, most again in children aged 10 years or younger. Children frequently fall while holding chopsticks in their mouths, leading to penetrating injuries. Accordingly, chopstick foreign body injuries frequently involve the oral cavity, particularly the hard and soft palate and area surrounding the palatine tonsil. In Japan, only two adult cases have been reported, neither of which involved the oral cavity but rather penetration of the orbit and temporal region of the head.

The mode of entry of the foreign body in the present patient is unknown. According to the prison officer, it is highly likely that the patient was made to hold the chopstick in his mouth, at which time he received a blow from behind, resulting in penetration. While this background is highly unusual, increasing globalisation, including population transfers, tourism, and changes in eating habits, predicts that an increasing number of people living in European and North American societies, in particular children, will experience penetration injuries by chopstick foreign bodies.

The most important part of the diagnosis and treatment of a foreign body is accurately identifying its nature and localisation. Chopsticks are generally of plant origin, and although localisation is usually attempted by ultrasonography, CT, and MRI, wooden foreign objects cannot always be identified.[3,5,6,9] In ultrasonography, a foreign body of plant origin presents a high-echo pattern, hampering precise localisation when located in a region surrounded by bony tissues.[1] In CT, these are visualised as a non-attenuated area due to the high air content. Attenuation may increase if the object absorbs water from the surrounding tissue.[6,9] Metallic paint, if any, is seen as a high-attenuation area. When

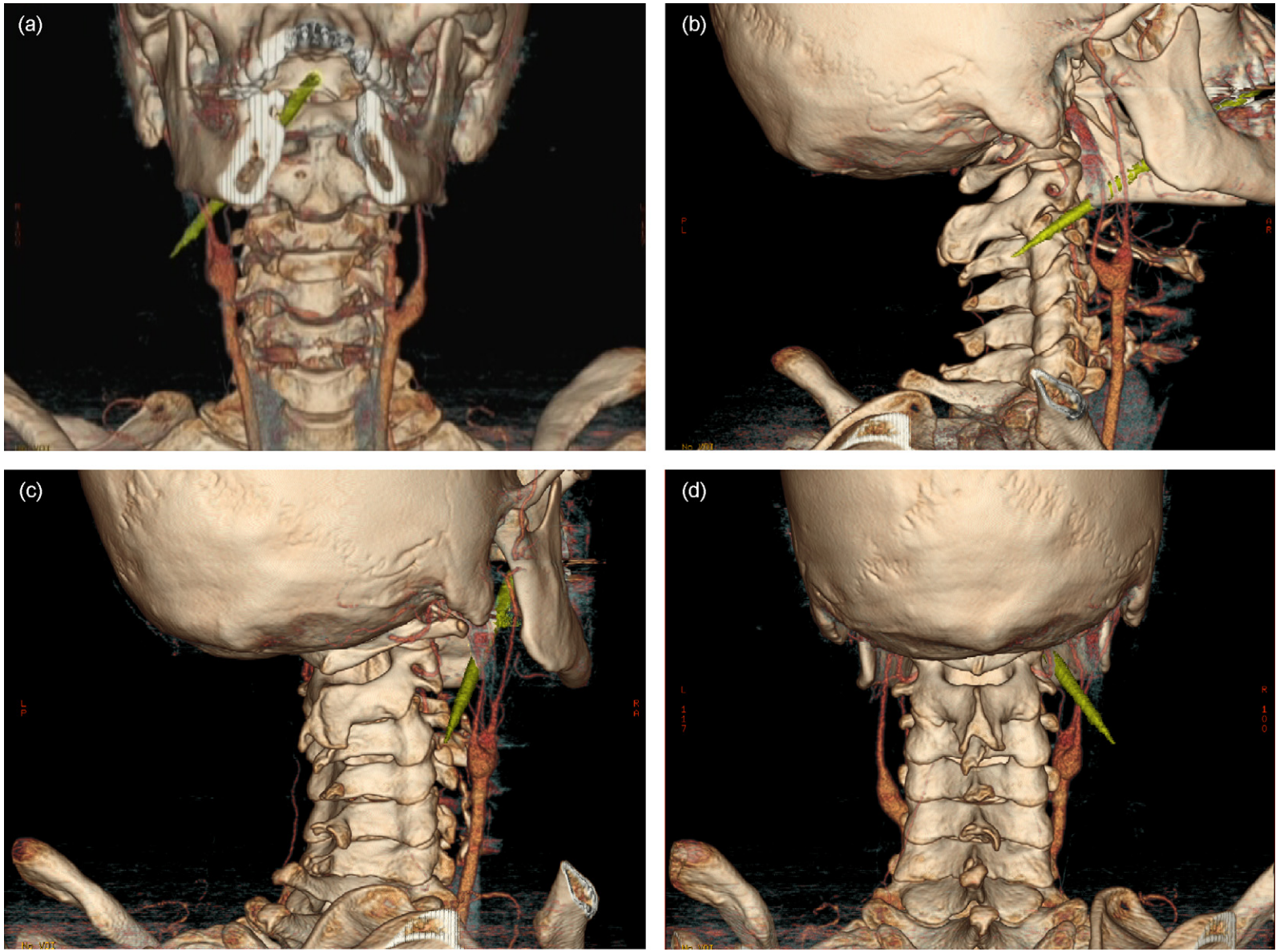

Fig. 4. Three-dimensional CT images. Three-dimensional CT images reconstructed on the basis of the CT values of the foreign body. The foreign body (green) passes through the space between the loop of the vertebral artery and the deep region of the internal carotid artery and reaches the posterior cervical region (a–d). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of the article.)

dental artifacts are present, the diagnostic value of CT is markedly reduced, not only with regard to foreign bodies but possibly to other diagnoses also. In MRI, a foreign body of plant origin is seen as of low signal intensity on T1- and T2-weighted images, although as the object absorbs water, it is detected as high-signal intensity on T2-weighted images.[6] The effects of dental artifacts are smaller in MRI than in CT, but as MRI requires a longer image-acquisition time, it is frequently difficult to conduct in children.

CT's ability to create images of deep regions over a wide area in a short time make it the first step in diagnosing a foreign body. In our present patient, we immediately performed enhanced CT, which provided sufficient information to enable location of the foreign body and determination of the relation between the foreign body and major vessels. The portion of the foreign body that was present outside the oral cavity was also tomographed, which allowed us to accurately determine the CT values of the foreign body. This information allowed us to increase CT window settings to allow visualisation, facilitating accurate location. Subsequent specialist reconstruction of three-dimensional CT images (Fig. 4a–d) using the CT values facilitated localisation, as well as its relation to the internal carotid and vertebral arteries, indicating the usefulness of reconstructed three-dimensional CT images in the diagnosis and management of these cases. For patients in whom a foreign body of plant origin is broken and embedded in the body, it would be advisable to simultaneously tomograph any available non-embedded portion and calculate CT value for the material, on the basis of which three-dimensional CT images can be reconstructed. Such reconstruction may be helpful for more precise localisation of the embedded foreign body. If the patient is seen at some time after penetration, absorption of moisture may have rendered the CT values of the embedded portion inconsistent with those of the non-embedded portion. On the contrary, if a patient is seen immediately after penetration, the non-embedded portion should be aggressively tomographed as described. However, reconstruction of three-dimensional images based on the CT values of a foreign body requires manual work by radiologists, and thus the use of these images in emergency cases is difficult, which is a challenging issue to be addressed.

5. Summary

We report a patient in whom a wooden foreign body entered the oral cavity and penetrated the neck. No major vessels were injured, and the foreign body was extracted successfully. Images based on the CT values of the foreign body itself were markedly useful in determining the location of the foreign body and its relation to major vessels.

References

1. Close JK, Shiels 2nd WE, Foster JA, Powell DA. Percutaneous ultrasound-guided intraorbital foreign body removal. Ophthal Plast Reconstr Surg 2009;25(4 (July–August)):335–7.
2. Ishikawa E, Meguro K, Yanaka K, Murakami T, Narushima K, Aoki T, et al. Intracerebellar penetrating injury and abscess due to a wooden foreign body—case report. Neurol Med Chir (Tokyo) 2000;40(9 (September)):458–62.
3. Kim S, Lee JY, Song JS, Oh J. Transorbital–intracranial injury by a chopstick: three-dimensional computedtomography. Acta Ophthalmol Scand 2005;83(5 (October)):609–10.
4. Ochiai H, Yamakawa Y, Fukushima T, Yamada H. Neuroimaging of a wooden foreign body retained for 5 months in the temporalis muscle following penetrating trauma with a chopstick: case report. Neurol Med Chir (Tokyo) 1999; 39:744–7.
5. Park SH, Cho KH, Shin YS, Kim SH, Ahn YH, Cho KG, et al. Penetrating craniofacial injuries in children with wooden and metal chopsticks. Pediatr Neurosurg 2006;42(3):138–46.
6. Singh RK, Bhandary S, Karki P. Managing a wooden foreign body in the neck. J Emerg Trauma Shock 2009;2(3 (September)):191–5.
7. Wei WI, Wong FL, Ho WK. A chopstick in the nose. J R Soc Med 2002;95(12 (December)):614–5.
8. Yamaguchi S, Eguchi K, Takeda M, Hidaka T, Shrestha P, Kurisu K. Penetrating injury of the upper cervical spine by a chopstick—case report. Neurol Med Chir (Tokyo) 2007;47(7 (July)):328–30.
9. Yamashita K, Noguchi T, Mihara F, Yoshiura T, Togao O, Yoshikawa H, et al. An intraorbital wooden foreign body: description of a case and a variety of CT appearances. Emerg Radiol 2007;14(1 (April)):41–3 [Epub 2007 Mar 9 PubMed PMID: 17347767].